EE - 111

B.E. (All Branches), I Year I Semester

Examination, December 2015

Choice Based Credit System (CBCS)

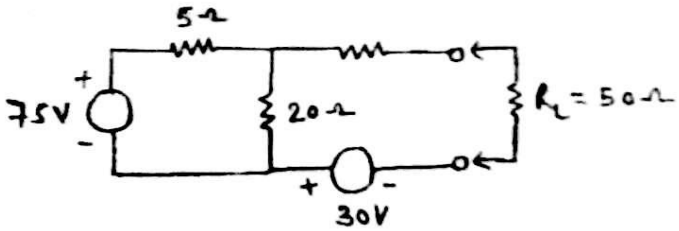
Fundamentals of Electrical Engineering

Time : Three Hours

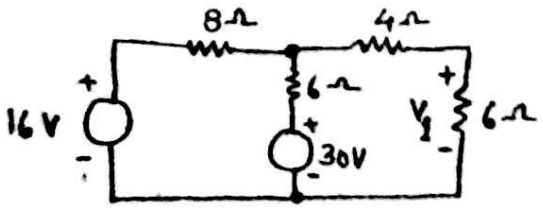
Maximum Marks : 60

Note : Attempt any five questions. All questions carry equal marks.

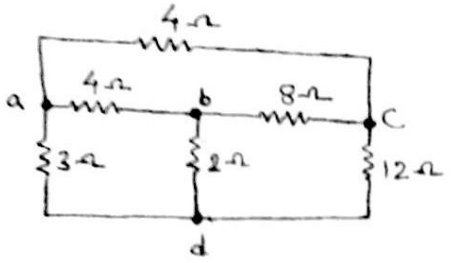
1. a) State Thevenin's theorem and explain procedure to apply Thevenin's theorem. Using this theorem find the current in resistance R_L shown in figure.



b) **In the circuit of figure find the voltage V_1 across the 6Ω resistance using nodal method of circuit analysis.**



c) Reduce the network of figure to obtain the equivalent resistance as seen between nodes ad.



2. a) Explain what is impedance. What role does it play in phasor diagrams?

b) Explain the meaning and significance of the power factor of a circuit.

c) Two impedances of $Z_1 = 8+j6$ and $Z_2 = 3-j4$ are in parallel. If the total current of the combination is 25A. Find the current taken and power taken by each impedance.

3. a) Derive the relationship between a line current and a phase current related to a star connected and delta connected load.

b) What do you mean by phase sequence in 3-ϕ AC voltage waveform, if 3-ϕ AC voltage waveform is available to a 3-ϕ motor, then how can we revert the phase sequence, and there by direction of rotation of motor.

c) A symmetrical 3-ϕ, 400 V system supplies a balanced load of 0.8 lagging power factor and connected in star. If the line current is 34.64 A, find:

i) Impedance

ii) Resistance and reactance per phase

iii) Total power.

4. a) Explain how current carrying conductor when placed in a magnetic field experiences a force.

b) Explain with circuit diagrams, the open circuit test and short circuit test to be conducted on 1-ϕ transformer.

c) An iron ring of 20 cm mean diameter has a cross section of 100 cm^2, is wound with 400 turns of a conducting wire. Calculate the exciting current required to establish a flux density of 1 Wb/m^2. If the relative permeability of iron is 1000. What is the value of energy stored.

5. a) Explain the procedure to analyse series magnetic circuit with air gap.

b) State and explain the laws of electro magnetic induction.

c) A single phase 50 Hz, 250 V (Primary) transformer has 80 turns on primary and 280 turns on secondary side. The area of core is 200 cm^2. Calculate

i) Maximum flux density on core

ii) Induced emf on secondary side.

6. a) Explain the construction and principle of operation of a synchronous motor.

b) Explain how the rotation of an induction motor is produced.

c) Enumerate the various types of losses occurring in electrical machines.

7. a) Name the main parts of a D.C. Machine and indicate their functions.

b) Derive an expression for induced emf in a transformer in terms of frequency, the maximum value of flux and the number of turns on the windings.

c) Discuss the magnetization characteristics of ferromagnetic materials.

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